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DISEASES OF THE NERVOUS SYSTEM

A PRACTICAL JOURNAL ON PSYCHIATRY AND NEUROLOGY

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DISEASES of the NERVOUS SYSTEM

(PUBLISHED MONTHLY)

A PRACTICAL JOURNAL ON PSYCHIATRY AND NEUROLOGY

*Pentothal Sleep as an Aid to the Diagnosis and Localization of Seizure Discharges of the Psychomotor Type**

BARTOLOME FUSTER, M.D.,**
ERNA L. GIBBS, M.D. and FREDERIC A. GIBBS, M.D.
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The chief clinical manifestations of psychomotor epilepsy are the following: The patient has an attack in which he becomes confused and amnesic, but he does not, as a rule, completely lose consciousness. His movements appear purposeful, but are poorly coordinated, and his manner is frequently negativistic. In general, his behavior is that of a person acting out a bad dream. Often during the seizure there are manifestations of fear or rage with screaming or shouting. In most seizures the movements are simple, repetitive and more or less automatic (Table I); for example, smacking the lips, wringing the hands or plucking the clothes. In some cases the movements are more elaborate and clearly purposeful; speech may be unaffected except as regards content. Usually in the interseizure period severe personality disorders are present. These may be of such high degree that the patient is classified as psychotic. Such seizures are common in patients with grand mal epilepsy but they occur also in patients without other epileptic manifestations. They are frequently misinterpreted as symptoms of hysteria or psychopathy.

TABLE I

Chief Behavioral Elements of Psychomotor Seizures

Incoordination	Chewing	Rubbing
Negativism	Swallowing	Plucking
Staring	Spitting	Undressing
Pushing	Smacking lips	Shouting
Groping	Laughing	Screaming
Searching	Crying	Confused talking

Electroencephalography aids greatly in the diagnosis of psychomotor epilepsy for even when no clinical seizure is present seizure discharges of a special type may occur.[1-4] Although these seizure discharges appeared in only 30 per cent of patients when studied awake,[5,6] they occurred in over 90 per cent if studied during sleep.[6] Drug-induced sleep proved to be as effective as natural sleep for uncovering seizure discharges.[7] Natural sleep has the advantage that it is without hazard but it is time consuming and inconvenient for routine examination. It seems possible that drug-induced sleep might be used routinely to facilitate the electroencephalographic diagnosis of psychomotor epilepsy. A drug was sought which would induce sleep quickly without disadvantageous side effects and leave the patient awake at the end of the procedure. Of the drugs studied,[7] sodium pentothal was selected because of its ease of administration, its rapid induction of sleep and its short period of action.[8-10] We have

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Read by title at the Second South American Neuro-Surgical meeting at Chile, April 25, 1947.

studied the effect of sleep induced with sodium pentothal on the other types of seizure discharges and found that it tends to precipitate not only the psychomotor type of discharge, but also the petit mal, petit mal variant and grand mal types of discharge.

Material and Method

By means of six and eight-channel electroencephalographs the electrical activity of the cortex was recorded in 40 clinically diagnosed cases of psychomotor epilepsy. Both ears connected together were used as a reference electrode, but for part of the recording each ear was used separately, leads from all scalp electrodes being run to the left ear and then to the right ear. In some cases the reference electrode was moved to the nose, chin, nape of the neck or the vertex. A lead from high in the nasopharynx was sometimes employed. "Bipolar" leads from electrodes in a row, in a triangle or in a circle were frequently employed.

The patient was prepared for the induction of sleep with pentothal by withholding the previous meal, or the stomach was pumped out if a meal had been ingested less than two hours before. The patient was asked to empty his bowel and bladder, and to remove artificial dentures. As a protection against laryngeal spasm, 0.3 to 0.6 mgm. of atropine sulfate (dose adjusted for age and weight) was administered by mouth before electrodes were applied. After application of the electrodes, which required approximately fifteen minutes, the patient reclined in bed with his neck bare and the chest sufficiently exposed to allow observation of intercostal respiration.

One cc. of a 2.5 per cent solution of sodium pentothal[11-13] was injected intravenously at a slow rate to determine the patient's reaction. The patient was told to count audibly about one number each second during the injection, and the first effect of the drug was usually observable in about 30 seconds. If no laryngeal spasm or distress occurred during the initial injection of one cc., or in the ensuing 30 seconds, the injection was continued at a rate of one cc. every ten seconds until four to six cc's. had been administered. After this the injection was halted for 30 to 35 seconds to permit the complete effect to appear. The patient usually counted more slowly and irregularly in a lower voice, began to yawn and ceased to count. If 35 seconds after cessation of injection the patient did not respond to verbal or painful stimuli, no more was injected. If thoracic respiration was good, and the patient was only lightly asleep, one or two cc's. more were injected. If counting did not cease or was resumed on request, the injection was continued and in some cases it was necessary to increase the rate of injection. The rapidity or sluggishness of the patient's counting guided the velocity and dosage of the injection until the desired level of relaxed sleep was obtained. The electroencephalogram served as an additional guide to dosage for an effort was made to adjust the dose to that which produced maximal spiking in the electroencephalogram.

The needle was left in the vein for one or two minutes after the termination of the injection to be certain that the subject did not rouse.

The amount of pentothal required varied greatly from case to case. Usually 5 to 12 cc's. sufficed but on rare occasions 18 or 20 cc's. were necessary. The duration of sleep also varied greatly, but usually it lasted from 10 to 20 minutes. If not disturbed the patient often slept for an hour or more, but could easily be awakened.

On waking the patient often did not know that he had been asleep, rarely remembered intervening events, and frequently continued to count, beginning at the number after that on which he had stopped.

To rouse the patient quickly and completely, caffeine or metrazol was sometimes injected before the electrodes were removed. It was possible, in the great majority of cases, to have the patient awake and well coordinated by the time the electrodes were off. For safety the patient was kept under observation in the laboratory for about one hour before being returned to the home or to the ward with an attendant.

Complications of barbiturate anesthesia, such as respiratory and circulatory depression, laryngospasm and drug sensitivity did not occur in the present series.

Results

In general, a short time after the beginning of the injection the electroencephalogram showed the fast waves of high amplitude

that are commonly seen with this type of barbiturate.[13] These fast waves appeared before the end of the injection and before consciousness was lost (B in Fig. 1). After one or two minutes, depending on the rate of injection, the amplitude of the rapid activity began to diminish and slow waves appeared with a frequency of 4 to 6 per second, and the amplitude of all activity decreased (C in Fig. 1). Following this, bursts of 14-per-second waves and slow waves of increased amplitude appeared and thereafter the tracing resembled that of spontaneous sleep. Only if the patient was roused before the full effect of the drug had disappeared did the electroencephalogram show high voltage fast activity.

During the phase of high voltage fast activity a slow-wave focus, which was difficult to see in the waking record or in deep stages of sleep was easily distinguished. At the end of the fast stage, spikes occasionally appeared, but these were difficult to see against the background of high voltage fast activity. Later, as the amplitude decreased, the anterior temporal spikes, which appeared in all cases of psychomotor epilepsy, were easily seen against the relatively flat background.

Spikes were usually more numerous during fairly light sleep; in some cases they appeared at only one stage of sleep. The stage most productive of spiking differed from case to case. In some patients when 14-per-second waves were mixed with periods of relatively little activity, bursts of spikes lasting from 8 to 12 seconds occurred with an interval of only 10 to 15 seconds between bursts. Each such discharge was followed by a slow negative component (D in Fig. 1).

In all 40 of the cases of psychomotor epilepsy in which sleep was induced with sodium

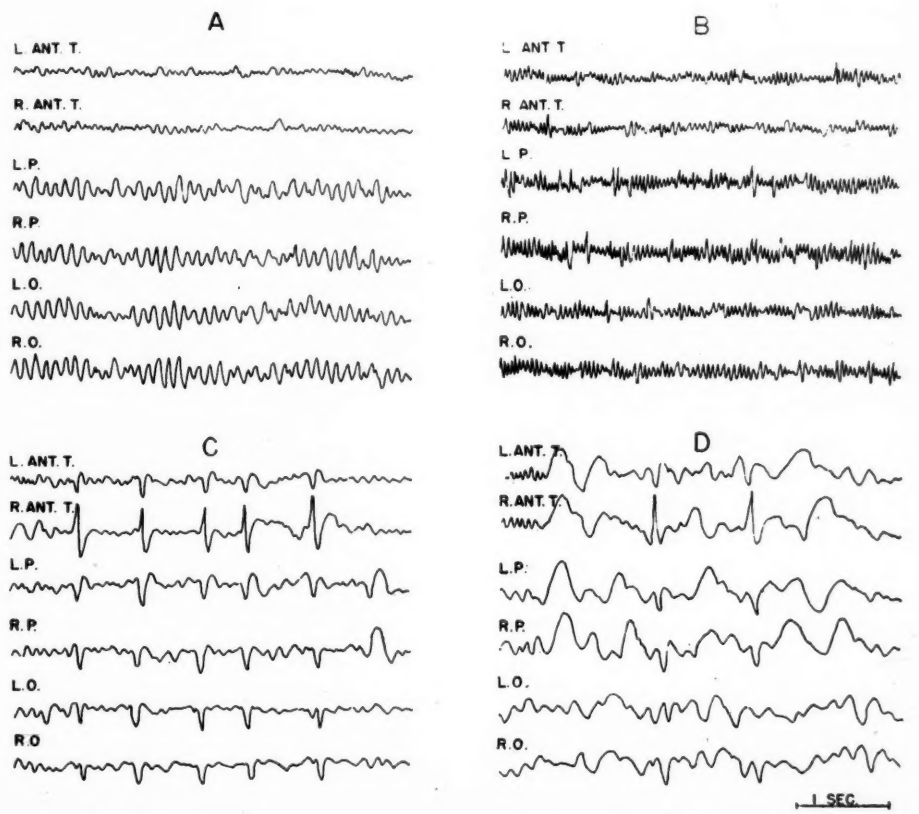

FIGURE 1

(A) Preceding; waking electroencephalogram, normal activity in all leads. (B) First stage of pentothal; normal response, fast activity in all leads with nothing which can be reliably interpreted as seizure discharges. (C) Second stage; moderate degree of slowing with negative spike seizure discharges in the right anterior temporal lead; the positive spikes in other leads are due to spread to the right ear. (D) Third stage; extreme slowing, with negative spike seizure discharges in right anterior temporal area, less numerous than in stage C, positive spikes in other leads are due to spread to the right ear.

Abbreviations: L., left; R., right; Ant. T., anterior temporal; P., parietal; O., occipital.

pentothal, the characteristic focus of negative spikes in the anterior temporal region was clearly demonstrated.

Discussion

In cases where the use of sodium pentothal is contra-indicated, or where over one hour of sleep is required it is desirable to rely on natural sleep, on a long-acting barbiturate or on paraldehyde. Eight to 14 cc. of paraldehyde given orally usually induces sleep in 6 to 15 minutes. Although the subject can be awakened he usually returns to sleep readily so that recording can be carried on for a prolonged period. Paraldehyde has the disadvantage of having a disagreeable taste (and for routine use it has too long an action). A relatively palatable preparation of paraldehyde furnished us by Dr. Carl Pfeiffer[14] was found to be acceptable to the patients and well tolerated.

For routine use with adults, pentothal is preferred because its action is rapid and brief. An important advantage of pentothal is that it may be used as an anesthetic if surgical exploration or ablation of an epileptogenic focus is contemplated. If recording is to be done from the exposed cortex, the level of anesthesia is adjusted to that at which pre-operative study has shown spiking to be maximal. When pentothal is used it is not necessary to stimulate electrically or inject convulsant drugs during the operation in order to demonstrate a seizure focus, for seizure discharges are precipitated by the pentothal anesthesia. Furthermore, since the discharges are always sub-clinical (not accompanied by movements), no precautions need be taken against motor disturbances such as are likely to occur with metrazol.

Summary and Conclusions

A technique is described for producing sleep with sodium pentothal in order to obtain electroencephalographic evidence of seizure discharges in patients with psychomotor epilepsy. Forty patients with psychomotor epilepsy were studied in this manner and all showed under pentothal sleep the characteristic anterior-temporal focus of spikes. The technique was used routinely on patients with a history of clinical psychomotor epilepsy. It is simple and takes only 5 to 6 minutes more than the ordinary waking electroencephalographic study. Sodium pentothal is recommended for use at operation where it serves a dual purpose as anesthetic and a precipitant of seizure discharge without danger of motor manifestations. For studies on children or when over one hour of sleep is required, paraldehyde by mouth or a long-acting barbiturate is recommended.

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The Treatment of Epilepsy

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"Epilepsy" is the oldest and probably the most widely known of all medical diseases; yet it is the most feared, by doctor and patient alike, and one of the most poorly treated. The average text book on psychiatry or neurology is surprisingly out-of-date and unduly pessimistic in its outlook on this subject. Therefore, I would like to present some practical, fundamental principles about the treatment of epileptics which can be followed easily in both letter and spirit by any general practitioner. These are the principles and philosophy we have found most useful in our practice at the Medical "C" Clinic at the University of Colorado Hospital.

Treatment in General

Treatment is approached from many angles, but chiefly from the psychobiological viewpoint that each patient is an individual human being with certain needs and problems, one of which (usually, though not always, the most important) is the fact that he has a chronic convulsive disorder. Most of the doctors in the clinic happen to be psychiatrists, but no special knowledge or experience is needed by the practitioner beyond the general facts presented in this paper. There will always be complications in the course of any illness as generalized in its effects as epilepsy, and just as occasionally a specialist is called in with diseases of the heart, chest or mind, so one sometimes needs to consult a specialist, either a neurologist or a psychiatrist, in the treatment of difficult or complicated cases of epilepsy. More often it may be necessary to consult a specialist in the diagnosis of "idiopathic epilepsy." Once the diagnosis has definitely been established, the treatment may be conducted on a fairly successful level by the average conscientious general practitioner.

It is not within the scope of this paper to present a differential diagnosis of convulsive disorders or to describe diagnostic methods used to establish the existence of a true "idiopathic epilepsy." However, one should remember that there are multiple causes for convulsive seizures which may occur at any age from birth to old age and death, and such things as brain tumors, hypoglycemia, toxic reactions, syphilis, meningitic infection, hysteria, etc., should be carefully ruled out before the diagnosis of epilepsy is considered. In all doubtful cases, the diagnostic test of most value is probably the electroencephalogram. (Approximately 85 to 90 per cent of epileptics show abnormal brain waives). Treatment of chronic convulsive disorders should be instituted only after a final, clear-cut decision is made as to the nature of the convulsions. In general the treatment outline which follows is only useful in those cases of so-called "idiopathic epilepsy" where no demonstrable causes exist other than birth injury or other brain trauma.

For the purposes of this discussion we may consider epilepsy according to the classification usually presented by Gibbs and Lennox as, "grand mal," "petit mal," and "psychomotor." We will also briefly mention so-called "Epileptic Equivalent states" and "Status Epilepticus." No matter what type of epilepsy he may have, the patient is usually a social problem. Often he comes to the clinic feeling rejected by family, friends and society. Here for the first time, he feels he "belongs." This is partly due to the fact that he is a member of a group of people who are suffering from a somewhat similar malady and have met some of the same problems he has in facing his illness, getting a job, getting married, etc. It is largely due to the fact that he has a sense of acceptance. He knows that the clinic secretary, the nurse, the social worker and the doctor like him and accept him even though he is "an epileptic." This is the first and most important principle in treatment, and is worth more than all the medicine in the pharmacopoeia. It may be difficult but it is extremely important for practitioners to consider their own prejudices in the matter of epilepsy. No doctor who dislikes a patient or looks down on him for having a certain

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type of illness can properly treat that patient. Helping to dispel the family's hostility toward the patient is an important job for the doctor also; this hostility is usually born of guilt feelings on the parents' part for having brought an epileptic into the world.

Next in importance is proper history taking and thorough diagnostic study which will not be considered fully here. It is important to mention, however, that a history of seizures is not complete unless it contains a first-hand, accurate description of a convulsion or attack by some reliable observer. One should know the following about seizures: the age at onset, possible causative factors in previous history (birth trauma, head injuries, infections, etc.), description of first seizure, description of subsequent typical seizures including any change in type, frequency of occurrence, approximate length of time of seizures, presence of aura, pre-disposing factors (fatigue, alcohol, exposure, etc), usual time of seizure (nocturnal seizures, early morning seizures, etc.), presence or absence of incontinence, tongue-biting, injuries during seizures, etc. One is always fortunate to be able to observe a seizure because often a more accurate diagnosis may be made in that manner. One important point in regard to history taking, which applies to any condition and especially to psychosomatic problems, is that a physician often learns more by allowing the patient to tell his own story freely and in his own way rather than by restricting himself to the formal history taking method.

When all necessary laboratory procedures and examinations have been done and the diagnosis established, one of the most important things to do is to tell both the patient and his family, in the most careful and accurate way possible, just what the difficulty is. The importance of giving this explanation plenty of time cannot be over-emphasized. Do not avoid or cringe at the word "epilepsy." It is a much misused term in scientific circles, but is unfortunately too widely used to be dropped and the fear and prejudice surrounding its use will not be broken down by dodging the issue. The patient deserves to know what his condition is and how to manage it. At the earliest age possible he should be given as full an explanation as he is able to understand, and every attempt should be made to encourage him to take over the responsibility for his illness and its treatment, to know the correct names for his medication, to keep track of his spells, and take charge of the medication schedule as prescribed. Appointments and prescriptions should be made out in his name and handed to him personally, and not his parents, unless of course, the patient is a babe in arms or hopelessly defective.

He should be instructed as to the nature of his illness and the possibilities of improvement with correct treatment. He should be encouraged to live and act in as normal a way as possible, depending on the degree of success of prescription. With patients who are successfully controlled over a period of months or years, no restrictions should be placed on their activities. Every patient should have a healthy amount of exercise, a properly balanced diet and fairly well regulated elimination. Suggestions as to moderation in diet, drink, stimulants, exercise and exposure should be made only to those patients who are not well controlled and in whom these factors are suspected of helping to precipitate seizures. It is commonly thought that stimulants such as coffee, tea and alcohol "cause" or precipitate seizures. We have found this factor to be of importance in only a few cases, and feel it is a mistake to overemphasize such factors in the average case. Patients who have occasional seizures should naturally not work around complicated machinery, or swim in deep water, or drive a car alone, etc. In some states epileptics are not allowed to obtain a driver's license. This is a wise law, but discretion should be used in its administration. We believe an epileptic who is well controlled and has been free of seizures a year or more, and is otherwise intelligent and responsible, should be allowed to drive a car. Many of these problems are discussed in a pamphlet[1] we distribute to the patients. However this reading will not take the place of personal discussion on these topics.

Some investigation into the personal life of every patient is highly important and necessary in the proper management of epilepsy. Even though a patient has abnormal brain waves, he may be well controlled on medication as long as his personal life runs smoothly. The most strenuous use of medication, however, will often be ineffectual if

there are still unsolved problems in relation to the patient's home life, his position in the community, his satisfaction in job relationships, his sexual and marital life, etc. Patients with chronic seizures often develop a severe degree of anxiety in relation to their illness and its effect on their future lives; this anxiety may be dispelled in one reassuring interview or it may take long and intensive psychotherapy with a complete aeration of all the patient's personality difficulties. In some of these cases, the services of a psychiatrist are required, but not often if the case is handled correctly from the beginning. The patient may have seizures in direct relation to the degree of anxiety present, regardless of his medication. Often, once the anxiety is taken care of, the medication may be reduced without complications. If the doctor does not allow the patient during his weekly or monthly visit enough time to talk freely about his problems, he may miss this fact completely. Patients do not like to feel rushed, and are hesitant about talking of personal problems even under the best of circumstances.

The question of deterioration in epilepsy and the so-called "epileptic personality" should be briefly considered. Generally speaking, most individuals with epileptic seizures are of average intelligence. The number of mental defectives among people who develop epilepsy is no greater than among the general population. Naturally, when the convulsive disorder is associated with birth injury or some congenital illness, there will more often be an accompanying mental deficiency on the same basis. An epileptic of average intelligence *whose seizures are well controlled* has no better chance of developing mental deficiency than any other individual of normal intelligence. However, it is true that in severe epileptics, who have repeated severe seizures, brain damage may result and so-called "deterioration" develop. These cases fortunately are becoming more rare every day. The once widely discussed "epileptic personality" (see Dostoevsky, *The Idiot)* may in general be considered a gross exaggeration. Individuals with abnormal brain waves often show irritability and impatience and frequently have temper tantrums and behavior disorders. These are symptoms of abnormal cortical excitations, and should be treated as such. They often clear up with proper medication. When they do not, they may be evidence of difficulties in the personal life of the individual and not directly due to the fact that the person has epilepsy. Again, epilepsy may exist concomitantly with emotional disorders which either exaggerate the already present tendency to convulsive seizures or actually produce atypical seizures which do not respond to medication. These individuals usually need psychiatric treatment.

One more practical word concerning the general management of seizures: we insist that each patient keep a seizure chart. So often a patient tends to minimize the frequency of his seizures or to be inaccurate about their occurrence. If we are to be sure of the control of seizures by a certain amount of medicine, we must have evidence of an actual decrease in severity and frequency of seizures over a reasonable length of time. We ask patients to keep these charts by the month and to mark each seizure according to whether it is major or minor on the proper day. A space is left for remarks about precipitating factors, change in type of seizure, missed medication, etc.

Medication

Treatment is considered here from the standpoint of medication. The history of drug therapy in epilepsy began with the introduction of the bromides in 1853 by Sir Charles Locock. Except in certain rural sections of the country, this therapy is now completely outmoded due to the undesirable side effects of the drug. In 1912 Hauptmann[2] introduced phenobarbital which has been the treatment of choice until very recently. In 1937 Dilantin was introduced by Putnam and Merritt[3] and since that time many new drugs have come into experimental use. Now there is more hope than ever before for the effective and simple control of epileptic seizures by the use of drugs. The following is a brief summary of the drugs available and their most effective use:

The principle usually followed in the use of anticonvulsants is to use as little of the chosen drug as necessary to produce the maximum desired result with the minimum of toxic effects. With the large number of different drugs available and the wide var-

iance in dosage, considerable juggling may be required over a period of months until the optimum dosage is found and the seizures are well controlled. This is known as "regulation." Each individual case will find his own formula and stick to it under the watchful eye of the physician. Most of the patients cooperate fully; many are apt to experiment with the dosage and increase or decrease their medication indiscriminately, and others may have lapses of memory or carelessly omit doses from time to time. Usually, these patients rapidly come to grief and recognize that the efficacy of medication depends upon regularity and consistency. Occasionally, an intelligent patient may be given a certain leeway with the dosage and allowed to increase the medication at times according to his own feelings; many women patients request permission to increase their dosage around the menstrual period and find that this helps to maintain their good results. No drug or combination of drugs should be discarded as useless until it has been given a fair trial over a period of months; patience is a prime requisite for both doctor and patient.

1. *Treatment of Grand Mal Type Epilepsy.*

Many new drugs have been introduced in the last few years, and I shall endeavor to evaluate a few which are most promising.

Dilantin (sodium diphenyl hydantoinate, Parke-Davis) is available in capsules of ½ gr. or 1½ gr., distinguished by a red band around the middle. It may be tried alone, in doses varying from ½ gr. t.i.d. for children to a maximum adult dose of 9 gr. per day, or it may be used in combination with the most effective minimum dose of phenobarbital. The average adult dose is 1½ gr. t.i.d. in combination with ½ to 1½ gr. of phenobarbital t.i.d. according to the usual timing of the seizures. T.i.d. for one patient may be with meals, another patient may need more medication early in the day or later in the afternoon and may shift the dosage time accordingly. For patients who have a tendency to nocturnal seizures, a bedtime dose of 1½ gr. may be given or, better still, a preparation of Dilantin in oil which is more slowly absorbed and lasts through the night. Some patients react well to Dilantin alone, and for these individuals, the use of phenobarbital is neither necessary nor desirable. Dilantin itself has little or no hypnotic effect and people who have clerical jobs or who depend on their mental faculties being alert through the day do not find their efficiency diminished as with phenobarbital. It is best to use as little phenobarbital as possible, for instance, with school children. Some patients seem to require phenobarbital for the control of their seizures; however, it seems that administration of Dilantin *with* the barbiturate cuts down on the amount of phenobarbital necessary to control seizures. In patients who for some reason are refractive or who react adversely to phenobarbital, a comparatively new drug, Mebaral (Winthrop) may be used in combination with Dilantin. This drug comes in doses of ½ gr. and 3 gr. and dosage varies from 3 to 6 gr. per day. With the exception of 3-methyl-5, 5-phenyl-ethyl- hydantoin, which will be considered separately, other new drugs will not be mentioned as their efficacy has not yet been proven.

Dilantin produces occasional side effects which so far have not been serious and usually disappear immediately upon discontinuance of the drug. It sometimes causes gastric upsets due to alkalinity, and for this reason is best taken with the meals. There have been some cases of nystagmus and ataxia, frequent dizziness. The most annoying toxic effect is that of gum hypertrophy which is sometimes present to an extreme degree, and as a result, such reactions interfere with treatment; these may be avoided by careful attention to oral hygiene. In severe cases the drug may be discontinued, but in general, an effective counter-measure is Vitamin C given in 25 or 50 mgm. doses with each dose of Dilantin. A few cases of Dilantin rash resembling measles have been reported. Usually patients who show sensitivity to Dilantin will respond to discontinuance of the drug and may tolerate small doses over a longer period of time until the effective dose can be maintained.

Caution must be voiced concerning the too rapid withdrawal of any drug because of the danger of precipitating a series of seizures. This also applies to a too rapid shift from one drug to another. Dosage of any new trial drug must be substituted *gradually* for the drug currently being taken by the patient, preferably over a period of one or two weeks.

2. *Treatment of Petit Mal Epilepsy.*

The petit mal type of epilepsy usually occurs in patients who suffer from grand mal attacks of varying degrees of intensity but often occurs alone especially in younger patients. Dilantin has much less effect on attacks of the petit mal variety; phenobarbital alone is often more effective. Neither drug is as effective as trimethyloxazolidine dione (Tridione, Abbott) for controlling petit mal seizures. It is a white powder, available in capsules of .3 gm. (4½ gr.) each. The dose varies from one to six capsules a day, but the average dose is usually about three capsules a day. Some patients may be controlled on one capsule each day. The drug has no effect on grand mal seizures and there is much evidence to support the theory that patients suffering from grand mal seizures which are not well controlled should not be given this drug; in patients who have both types of epilepsy, Tridione should be given with caution. Our observations, as well as other reports, indicate that often Tridione may result in some exacerbation of the grand mal seizures at first; but if the dosage is continued cautiously, after a week or so, the patient settles down with better results in the long run. Some patients must be given trial doses of three different types of medication in varying dosages before they are well "regulated" and may find a combination of the three drugs most effective.

Tridione sometimes produces dizziness, vertigo, and skin rash. A common symptom is an annoying and unusual visual sensitivity to light, commonly referred to as photophobia. Patients should be advised to wear dark glasses and usually develop a tolerance; no eye damage has been reported. Several cases of agranulocytic anemia have been reported by Harrison, et al,[4] and Tridione was unmistakably implicated. However, this has only occurred in five out of many thousands of cases reported in the literature and may be avoided by the simple procedure of taking regular monthly blood counts and discontinuing the medicine on the first sign of leukopenia. The dosage should begin with a minimum dose (one capsule a day) and the blood watched every week until regular dosage is well established.

3. *Treatment of Psychomotor Attacks, Epileptic Equivalent States, and Behavior Problems.*

This diagnosis is more difficult to make, and one should rely heavily on the presence of abnormal brain waves in cases of this sort. The treatment is as variable as the condition and is often unsuccessful. Wherever periodic attacks of peculiar behavior, fugue states, amnesic episodes, temper tantrums, or simple automatic repetition of odd motor performances occur and are substantiated by a positive electroencephalogram, a clinical trial of one or more or a combination of the above drugs should be made for the most beneficial therapeutic effect. There is some evidence that Tridione is effective in the so-called psychomotor attacks but usually Dilantin is more successful as it is in the treatment of temper tantrums, behavior disorders, etc. In many of these cases, psychiatric treatment is a necessary adjunct.

4. *Treatment of Status Epilepticus.*

In the treatment of any single convulsion, it is important to remember two things: most people become panicky on witnessing a convulsion, and there is very little to do for the patient himself except to protect him. Patient should not be allowed to wander away unaccompanied too soon after a seizure because it is usually followed by a period of confusion and disorientation.

In cases where the seizure or the confusional state (furor state) lasts longer than seems normal, or in cases where repeated convulsions occur in rapid succession (status epilepticus), emergency treatment should be immediately instituted. Any method of heavy sedation may be used, and in rare cases, a general anesthetic may become necessary. Often the patient's life or that of his neighbors may be in danger and hospitalization may be necessary. Usually effective is Sodium Phenobarbital, gr. 6-12 i.m., or Sodium Amytal, gr. 7½ to 15 i.v. Paraldehyde may be administered by i.m. injection although this is less desirable; the dose is 3 to 6 cc. Choral hydrate may be administered rectally, from 4 to 8 cc., or in larger doses if necessary.

5. *The Use of Mesantoin and Hydantal.*

Two new drugs have recently been administered under our clinic research program with encouraging success. Several favorable and encouraging reports dealing with Mesantoin and Hydantal have recently appeared in the literature. Mesantoin (3-methyl-5, 5-phenyl-ethyl-hydantoin, Sandoz) is closely related to Dilantin and is reported to have less toxic effects and to be more successful with difficult treatment problems. Hydantal, which has not yet been released commercially, is a combination of Mesantoin 0.1 gm. and 1/3 gr. phenobarbital. This has been found to be effective in many cases of epilepsy which have not responded to other types of treatment and in recalcitrant behavior problems (Tietz[5]). The reports to date have been of cases who had been formerly treated with every known combination with poor results; in these cases, Mesantoin was found to be much more effective than other drugs in reducing both the frequency and severity of seizures. When this drug is tried on a series of fresh cases which have not been subjected to previous treatment, the results are found to be better. The drug comes in pink segmented tablets of 0.1 gram (1½ grains). One should begin with a small dose, 3/4ths of a grain or less once a day and increase slowly to the tolerated effective dose, which in most cases has been 1½ gr. b.i.d. or t.i.d. It may be used in combination with phenobarbital or Dilantin, but is usually effective by itself. Von Hagen,[6] Clein,[7] Loscalzo,[8] Lennox,[9] Kozol,[10] Aring,[11] Carter,[12] Aird,[13] Cohen,[14] Price,[15] Loscalzo,[16] Harris and Otto,[17] Aird.[18]

In view of the fact that very few side effects have been reported in the literature so far, our results with this medicine should be emphasized. We have had very good results in a small series of selected cases, but we have had a few cases of toxicity which could have been prevented had we been more watchful and had our patients been observed more carefully by their relatives. These reactions, which resembled a severe virus infection in four cases, may appear alarming but disappear when the drug is discontinued. One case is described below. Two things should be borne in mind: 1) no other report similar to ours has appeared in the literature and 2) the drug was not discontinued immediately in several cases so the effects were probably worse than they should have been. If any patient appears to be sensitive to this drug, it is suggested that cautious administration of small doses over a period of ten days may be more effective and allow subsequently larger doses to be administered without toxic affects.

CASE REPORTS

H.G., a 17 year old girl, was given Mesantoin gr. 1½ t.i.d. for a period of several months. The first month of treatment she complained of severe headaches, photophobia, malaise and had fever, generalized lymphadenopathy and pharyngitis. She was hospitalized and a diagnosis of virus infection of unknown etiology was made. Symptoms cleared up when the medicine was discontinued, but did not recur after medicine was resumed.

Two other cases of toxicity began with rash resembling measles.

In spite of a few side effects, which are being reported so that they may be watched for and prevented in the future, we had good results in 30 selected cases.

E.P., a 17 year old boy, was referred from the Medical Clinic for grand mal seizures. Since the age of one, he had had one or two seizures every day until 1944 and then for three years had had two or three seizures a month. He was treated for brief periods with phenobarbital and Dilantin. He was on no medication when referred to our clinic. He was given Mesantoin in March 1947, and was maintained on a dose of 2 tablets t.i.d. until November 1947, when the medication was reduced to 5 a day. During the year of treatment with Mesantoin, he has had only three seizures as compared with two or three a month before treatment was instituted.

A.T., a 55 year old Spanish-American male, complained of frequent and severe grand mal and petit mal attacks. When first seen was mentally dull and very confused. Dilantin and phenobarbital had little effect. Mesantoin instituted in August 1947. During the five months of treatment, patient improved remarkably in both mental status and frequency and severity of seizures.

J.B., a 23 year old male, was admitted to Colorado General Hospital in January 1947 with a history of severe idiopathic epilepsy since the age of 17 and chronic alcoholism. In status epilepticus at the time of admission. He had been treated variously with Dilantin, phenobarbital and proprietary preparations from a mail order drug house. He was placed on Hydantal, which was later changed to Mesantoin because of complaints of excessive sleepiness. He was also given daily doses of Dilantin in oil. He has had few seizures since February 1947, an average of about one

every two months as compared to his previous history of several a day. He has joined Alcoholics Anonymous and now has a steady job.

S.S., a 44 year old female with a history of grand mal seizures since the age of 24. First attack occurred during pregnancy. She was treated with Dilantin in oil, but attacks still occurred every month or so. Started on Mesantoin in June 1947 q.i.d. She has had two seizures during the last eight months and feels much improved and encouraged over treatment.

Any case not responding to Dilantin and phenobarbital, and those cases which experience side effects, should be placed on a regime of Mesantoin. Judging from my experience and that of other investigators, there is every indication that it promises to be a genuine contribution in the treatment of early, uncomplicated cases of idiopathic epilepsy. In one or two cases of definite posttraumatic epilepsy, excellent results have been obtained when other therapy failed.

A.C., a 20 year old male with a history of subdural hematoma in 1941, removed by operation at that time. First grand mal seizure occurred in 1944 and recurred with increasing frequency every month or so. Seizures always nocturnal. Patient was started on Mesantoin b.i.d. in July 1947 and has had no seizures since. No other medication was given.

Summary

The treatment of idiopathic epilepsy is a problem for the general practitioner in most communities. A practical and workable program for this treatment is outlined above with a detailed consideration of the use of medication. Emphasis is placed on the psychosomatic nature of the problem and the fact that each individual case should be considered separately.

A new drug, Mesantoin, is considered a useful tool in the management of convulsive seizures.

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*Mental Hygiene in a World Crisis**

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The Biodynamics of Behavior

Voltaire once said that the deepest verities are the simplest and most common, but that he who seeks truth should be of no clique or country. We can, with scientific accuracy follow these precepts in our present discussion of individual and social psychology. Indeed, all systems of psychology, though they seem to clash in terminology and peripheral detail, boil down to a few fundamental concepts applicable to the behavior of men everywhere. I have formulated some of these concepts, now called the Principles of Biodynamics, in various technical books; here, however, let me state them as briefly as I can in four simple propositions.

The first principle deals with motivation and states in elementary terms that every human being is basically motivated to survive and to propogate his kind.

The second principle points out that each human being reacts to the world about him not as others view it, but as he himself interprets his surroundings in terms of his own capacities and individual experiences.

The third principle reveals that when normal human adaptations are frustrated by external circumstances, man's behavior becomes deviated into substitutive channels such as fantasy formations, retreats to immature patterns of conduct, or reactive hostilities and aggressions.

Finally, the fourth principle asserts that when inner strivings become conflictful with each other and so make adequate external adjustments impossible, man's behavior becomes highly deviated, substitutive, regressive and fantasy-ridden or, as we know it clinically, neurotic or psychotic.

Of course these principles, in bare outline, do not constitute the whole or even the essence of psychiatry, and yet it is remarkable how much of human conduct from the cradle to the grave falls within their scope. Let us, for instance, trace their combined relevance to the evolution of human behavior, the child's adaptations to its milieu, and the significance of such adaptations to proper or improper "mental hygiene" in later life. To begin with, the very survival of the human infant necessitates not only feeding, but tender care and affection which must be lavished upon it by parents capable of unselfish devotion. Similarly, for the first few years the child's most poignant experiences revolve about its needs for acceptance and security in a stable home; if these needs are frustrated, life-long doubts and distrusts are implanted. The adolescent, in his early contacts with a competitive world, requires sympathetic but realistic guidance in his educational, sexual, occupational and social adjustments, else he may revert to a demanding helplessness or become disillusioned, bitter and antagonistic —or, as we summarily label him, "delinquent." Young men and women of marriageable age must develop new capacities for mutual sharing, planning and living,—else romance turns to recrimination, and then to Reno. The middle-aged must often give up unrealistic financial, social and other ambitions, permit their grown children to emancipate themselves from their grasp, and reconcile themselves to the sexual climacteric and declining physical fervor—all without attempting to recapture their lost youth through hormone injections, or by ungraceful athletics out of doors and disgraceful athletics within. The aged often again become helpless and dependent and must then seek surcease in mature and mellow wisdom and deserved familial respect. Severe frustrations during any of these periods will, of course, produce conflicts and anxieties, with their attendant expressions in so-called psychosomatic illnesses, concurrent neurotic fears, obsessions and ritualisms, temptations to find release in drugs or alcohol, or even the final escapes into fantasy and delusion that fill our psychiatric offices and our mental hospitals.

This, in a paragraph, is a summary of

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"mental hygiene," minus the almost innumerable changes usually rung upon these themes. But today we are faced with a far larger and more important task: namely, to apply the same psychologic principles to the problems of world peace and security, without which personal peace and equanimity are but taunting phrases.

Biodynamics of World Mental Hygiene

Principle of Motivation: This principle, when applied to group psychology on a terrestrial scale, leads immediately to a simple but fundamental truth: namely, that at the deeper levels men everywhere are basically motivated not by ideals or even ideologies, but by prosaic needs for food, warmth, shelter and such other necessities as they and their families require for physical subsistence and reasonable comfort. It is regrettable that only recently has this mundane fact been brought home to our erudite statesmen, with the result that our diplomatic policies have acquired an unaccustomed overtone of true humanitarianism and the promising echo of vastly increased effectiveness. But we shall have to protect this temporary gain against the reactions of short-sighted greed and renewed isolationisms that are sure to come.

Principle of Milieu-Interpretation: Our second dynamic principle, when also applied socially, deals with the fact that human beings differ widely in their individual experiences, and deviate correspondingly from each other in their interpretations of a common reality, in the meanings they ascribe to words and symbols, and in their modes of personal and social action. These differences are even more pronounced among groups of men living in cultures widely separated in space, time, environment, language and custom; in fact, under such circumstances serious difficulties in communication arise and misunderstandings of motives and actions among nations become almost inevitable. Unfortunately, whole peoples may then revert to the primitive attitude that anything strange or foreign is necessarily hostile and threatening, and must therefore be subdued or destroyed. Never was there greater need for a universally meaningful language by which all men, utilizing to the full the technologic facilities of our age, could speak to each other directly, and so learn how basically alike—and thereby truly fraternal—they are despite external trappings of color, speech and custom. Meanwhile, if the renascent nationalisms, grave suspicions and reactive hostilities among the peoples of the earth are to be held in check, certain definite steps must be taken. Nations and groups of nations must cease their anxious insistence that all the rest of the world must be cast in their respective images, or else be regarded as enemies. For instance, we cannot decry, however rightfully, Russia's frenetic attempts to secure her own safety by communizing the world, and at the same time threaten to withold our own aid from the European democracies because certain of their socialistic trends do not exactly correspond with our own traditional practices. Nations must also abandon the use of hypocritical slogans and euphemisms, together with the cherished custom of pounding them selfrighteously into other people's ears. As to the fundamentals of political doctrine we of the Western Hemisphere—and in essence throughout the world—are agreed that a true political and economic democracy is the ideal society, and that tyranical systems—facist, corporative, or communist—can find no place in the ultimate brotherhood of man. But what price our assumed patent on the term "democracy" when every country on earth, from communist Russia to fascist Spain, calls itself "democratic," and when certain regions of our own beloved nation still disfranchise minorities and hold them in social servitude? Better to speak of individual freedoms, personal safeties, economic securities and opportunities for happy and creative living—then and then only, will we resonate with the deepest desires of men everywhere, and be everywhere understood.

Principle of Substitutive Behavior: As will be recalled, the third dynamic principle states that when our strivings toward the normal satisfactions of life are frustrated, our behavior tends to become deviated, substitutive and increasingly unrealistic. Psychoanalysis has clarified many of the deviant patterns of conduct that appear under such circumstances, and these patterns are also clearly discernible in group behavior in times of stress. Let us review some of their social implications.

First, there is a tendency to depreciate

the seriousness of an impending threat, or even to deny the actual presence of an unacceptable reality. Thus, we are inclined to turn away from the imminence of world starvation and stark chaos, so that we may justify and rationalize our current desultoriness in planning and action. Unfortunately, this does not prevent the real situation from deteriorating, so that other evasions soon become necessary. Among these are the various forms of escapism, such as preoccupations with the trivia of fashion, the spurious excitements of spectator sports, the false hopes of reckless gambling, the diversions of profligate sensuality, or the numbing haze of alcohol and drugs—in fact, to paraphrase Lenin, it may be more truly said that such opiates have become the religion of the people. But these dissipations, too, offer no truly satisfactory escapes from the nagging anxieties that underlie them, so that even more fantastic retreats and regressions must be called into play. And so there arise strange faiths and philosophies which preach cynicism and futility: as examples, witness the crass hedonism of the newer fascist movements in Germany, the mystic "existentialist" doctrines of Sartré and his French followers, and the rebirth of racist and other superstitions in this country. Academic circles, too, are not immune to these intellectual vagaries: from at least one university busily engaged in developing bigger and "better" atmoic bombs there now issues a call for all men to immerse themselves in whatever "Great Books" are selected for them by their intellectual betters, and so attempt to solve all the unprecedented problems of today by the ancient artifices of Aristotle or the pert platitudes of Plato. It is regrettable indeed that certain teachers of our youth revert to this form of medieval scholasticism at a time when old errors should be left to moulder in the dust of history, and when new knowledge and more comprehensive insights are essential to effective action.

The escapist defenses thus far considered have been mainly in the field of relatively harmless ruminations and futile diffusions of effort; unfortunately, other patterns of neurotic reaction to stress are equally common and threaten to become far more dangerous. Among these may be mentioned the mechanisms of channelization and projection—psychoanalytic terms which signify certain tendencies all of us feel to blame others for our own guilts and failures. In the beginning, we generally select some weak person or group as our scapegoat, with the result that the condemnations and persecutions of minorities are recurrent features of most social crises. But since such deviations of frustration and anger are not altogether satisfying to the self-aggrandizing majority, other and more formidable adversaries are soon selected. In this way the system may expand into a sweeping social paranoia, replete with spreading phobias, fantastic witch-hunts, increasingly elaborate ideas of danger and persecution, and finally, acts of panic-ridden reprisal which lead to the ultimate insanity of war. These patterns constitute so great a threat to our very survival that, however brief our discussion, we must delve more deeply into their psychologic causation.

The Psycho-Dynamics of Aggression: Men have long realized—and some have been ashamed of the fact—that they and certain species of insects were among the few forms of animal life that wage communal warfare. Freud, faced with the phenomena of cruelty and self-immolation in human conduct, gave the question a new twist about a generation ago by postulating that perhaps man was motivated not only by drives toward personal and racial survival, but by equally powerful "death-instincts" which lead to external aggression and eventual self-destruction. Freud himself continued to regard this thesis as highly tenuous and speculative, yet so many of the master's less critical followers adopted his concept of Thanatos that malevolence began to be regarded as an inborn part of man's nature, and war and perhaps racial suicide his inevitable fate. Actually, deeper researches into comparative, developmental and social psychology have shown that aggressivity is not innate in human behavior although, in our culture, it may appear very early in life as a response to frustrations in infancy and childhood, and may then become channelized into patterns of hatred, hostility and easily-evoked belligerance. Though stated categorically here, this reorientation is of immeasurable importance, since it means that when we can construct a society in which want and competitiveness are reduced to a minimum and

man need no longer meet intolerable deprivations, personal and mass warfare will vanish as completely from the earth as did the brutal tyranosaurs of the Mesozoic stage of our evolution.

Principle of Conflict: The last of our four principles is concerned with the effects of internal conflicts and external maladjustments in causing serious and lasting aberrations of human behavior. As to consistency of motivation, how can any of us attain internal peace when, as Franz Alexander pointed out, each of us in this Age of Unreason is pressed by social custom to act as everyone else's friend, but is at the same time forced by social necessity to be everyone's rival? Moreover, how can we devote ourselves wholeheartedly to our daily pursuits: our studies, our work, our families, and our other social, esthetic or scientific services to humanity when all the while the deepening shadow of world catastrophe darkens every thought and deed? Equanimity is impossible under such stress, and the consequences of this negation are increasingly grave. By comparison, even during the last war, the incidence of mental illnesses dropped remarkably in civilian populations welded together by unity of purpose and effort, as was the case in Britain. Now, with immediate physical danger gone but confusion and uncertainty everywhere, eight million of us in this country alone are seriously neurotic, three million are chronically alcoholic, at least one in fifty of us is destined to be a known suicide, and one in fourteen will be committed to a mental hospital. But even aside from such statistics, for the rest of us who are trying to live normally the old formulas of mental hygiene become thin and inane, and vanish to insignificance when compared to the immediate necessity for re-establishing understanding, tolerance and peace among men and nations and stability in a world which otherwise threatens to become uninhabitable.

Terrestrial Mental Hygiene: Humanity echoes the cry: but how can this be done?—and the experienced among us are tempted to pessimism and inaction. For even though, as healers of the minds of man, we can formulate a prescription, it would have to be couched in a language of humanism that potentates and militarists have never learned to understand. Accordingly, we would be discounted as unintelligible idealists who have become a little unbalanced by too much confinement in our stuffy libraries, laboratories and clinics during the week and our churches on Sunday and who should therefore exercise in the bracing air of the parade-ground and the shooting range so that we may become more alert and practical. Nevertheless, let us essay our advice, if only on the premise that if our efforts are futile, no harm can be done, whereas if they are not completely so any alteration in our current course into catastrophe would be an incalculable change for the better. Unfortunately, it is now too late to correct our own past pedagogic failures with our youth or to educate a new generation in the global aspects of mental hygiene, since the bacterial warfare of the day after tomorrow will kill too quickly and atomic explosions will travel with the speed of light. Consequently we, the men and women of good will in every land must concentrate immediately on the psychologic enlightenment of our representatives in power, and utilize every means at our command to influence them toward fundamental changes in national and international policies. First, they must no longer ignore the basic needs of large masses of humanity. Second, they must not try to impose on the entire world a religious, cultural or political uniformity modelled after the prejudices of a single people. Third, they must cease their attempts to further the interests of one group, "class," "race," or nation over another by Machiavellian maneuvers, power politics, threats of aggression, or, most tragic and futile of all, precipitate military action. Instead, let us again insist on wisdom, tolerance, human insight and informed action while there is yet time to avert what is probably the final crisis of mankind.

Group Psychotherapy in the State Hospital

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In reviewing the progress of American psychiatry during World War II, Dr. Strecker made this remark: "Perhaps the most important development in psychological treatment has been application of group psychotherapy." The wealth of literature on the subject is a good indication of its wide recognition and utilization as a psychotherapeutic procedure. In the post-war period, it has become an accepted method in the state hospitals, Veterans' Administrations Clinics, outpatient departments of the psychiatric clinics as well as in the private practice of psychiatry. The opinion has been expressed that it can be advantageously used in the penocorrectional institutions where a psychiatrist is available.

Group psychotherapy was introduced at the Traverse City State Hospital in the early spring of 1947 when an alcoholics group was organized and weekly meetings were held with several members of the medical staff attending in order to work out the details of the technique. The superintendent of the hospital and the entire medical staff cooperated. The patients' response was very enthusiastic and their participation was whole-hearted. One of the alcoholics felt that he benefited so much through these meetings that upon discharge from the hospital he drove 60 miles every week in order to attend. The length of the meetings was gradually increased from one hour to two and then to two and a half hours since the patients were anxious to hold them that long.

Three different types of group therapy have been developed to fit the conditions existing at this hospital. One type was for the psychotic patients who were on the insulin service. Another type was for severe psychoneurotic female patients and the third type of group therapy was for the alcoholics. The group therapy for psychotics was organized in the early spring of 1947 and consisted of the young female patients. The group meetings were conducted on the insulin unit of the hospital. The majority of the members of the group were partially recovered schizophrenics, who were at the time receiving insulin shock therapy. Since the majority of our patients in general are psychotics, it was a valuable experiment to determine whether or not group therapy is applicable to such patients. Most of the available literature on group therapy deals with the psychoneurotic patients and not psychotics. Because of the nature of the psychotic disorders, the technique had to be modified to fit such patients.

Our group on the female side consisted of eight to ten patients who met twice a week on a voluntary basis. All the patients were seen individually before being admitted to the group. The therapist assumed an active role and chose the material for discussion that would touch upon the dynamic principles usually encountered in the production of a psychosis. Discussion of the development of the personality from infancy on, emotional relationship between children and parents, with emphasis on oedipal situations and sibling rivalry were very popular topics. Patients were encouraged to draw examples from their own memories and experiences. Attempt was always made to hear from each patient during the session and at times in order to achieve that goal certain questions were presented to the group and *everybody* was asked to express an opinion on the subject. Even the withdrawn, preoccupied patient, only in partial contact with reality, was able to contribute some valid opinions, aiding the therapist to a better understanding of the case, besides giving an opportunity to the patient eventually to socialize herself. Identification of a psychotic patient with the group was in itself an important step towards the ultimate goal of bringing the patient back into society. Controversial opinions were further discussed and each patient was encouraged to defend her ideas and ideals. In many instances, the socially acceptable patterns of behavior were brought to their attention in contrast to their deviate behavior. In the course of the group proceedings, patients were given an ample chance

to express any hostility and aggressiveness that they had toward hospital personnel.

This "negative transference" toward the people carrying the keys in the hospital may have interesting symbolic significance as we found out. Depending on each individual case it may be interpreted in various ways, such as hostility from or resentment to being locked up, or as a characteristic transference reaction which was the individual pattern in the patient's relations with her own parents in the course of her childhood development. In another patient, it may be an infantile rage pattern as a reaction to the frustrating situation created by hospitalization *per se,* or, lastly, it may be a justified reaction in instances where attendants took advantage of their position. This latter point was of value administratively when patient-attendant relations were discussed with the attendants. This information was passed on to the attendants at the "attendants' meetings" so that eventually better relations were established between the parties concerned. Since we suspect that some of the "spontaneous cures" reported in literature depend on good, healthy relationships between the patients and understanding attendants based on transference phenomenon, we aim to enhance it in every possible way.

Another point worthy of mention is that patients were encouraged to express openly feelings which they had previously kept to themselves and would otherwise not have had a chance to express. This form of catharsis was of value to the patient. Meanwhile, they were learning and getting into the habit of expressing their emotions instead of suppressing them. Patient to patient transference in many instances resulted in the improvement of the personal relations of the patients. The "group spirit" raised their morale a notch or two and they had more definite feelings of "belongingness." Sibling rivalry among some of the more active patients toward the "father figure" of the therapist was noted and led to a better understanding by the therapist of the dynamics involved in those special cases.

Group therapy for the male psychotic patients receiving insulin shock treatment was organized in the latter part of the summer (1947) and was conducted on the same principles as the one for the female patients. This group consisted of eight patients, three of whom were diagnosed as schizophrenia, catatonic type. The response of catatonic patients to the group therapy situation was interesting in that they took it all in and later during the individual interviews mentioned some of the questions discussed during the group meetings. Even though they had been very passive during the meetings, they portrayed considerable interest. Particular effort was made to make these patients feel that they were part of the insulin unit community and that they had social obligations and responsibilities. Since so many of the patients were burdened with excessive guilt feelings, all the factors responsible for the production of the "guilt complex" were gone over in detail and the patients were encouraged to talk about their own personal feelings of guilt in relation to their life situations. Three of the patients were able to release enough guilt feelings during these group meetings to show noticeable improvement following this form of catharsis. During the group meetings, some of the hospital regulations were explained to them including the reasons for and the necessity of keeping the doors locked. Out of this experience of carrying on group therapy with psychotic patients undergoing insulin treatment, we found out that the very passive and negativistic psychotic patients distort the group and constitute poor material for the group work because they reduce the group energy and the passivity in itself is contagious.

Group therapy, although not a major therapy for the psychotic patient is a valuable adjunct to the "total push" that a patient receives during his treatment in the hospital and deserves a place in the treatment program for the partially recovered psychotics to expedite their recovery, especially as applied to the insulin treated patients. The criteria for selection of such psychotic patients for group therapy have not been completely worked out as yet and further experience will be of great benefit. Since the number of patients receiving insulin shock treatments varies between eight and ten on both male and female sides, we usually attempt to include all the patients receiving insulin treatment at that particular time in the group and new members are introduced as they come in.

The second type of group therapy for the neurotic female patients, who constitute a fairly small percentage of the committed patients in a state hospital, started out as a mixed group of neurotic and partially recovered psychotic patients. The meetings were conducted twice weekly for one to one and a half hours and the therapist was a central figure in guiding the group discussions along the lines of dynamic principles operative in the production of both minor and major types of mental illness. Since it was found that psychotics were slowing down the tempo of the group and retarding the over-all progress due to their relative passivity and lack of warmth and sociability, they were separated by organizing separate groups for neurotics and transferring selected psychotic patients to the insulin group for female patients.

The group stripped of the psychotic patients was carried along the conventional lines of group psychotherapy for the neurotic patients as described in recent literature. Since most of the patients were chronic, severe psychoneurotics the progress was slow and laborious but the results did not differ materially from the findings presented in the literature. This group was structured on both semi-pedagogical as well as analytical approaches. The first phase was to acquaint the patients with the psychological dynamic principles involved and such books as "Love Against Hate" and "Man Against Himself" by Karl A. Menninger and "Our Inner Conflicts" and the "Neurotic Personality of Our Time" by Karen Horney were used as reference books and reading material. The second phase consisted of a discussion of these principles as applied to them and their interpersonal relationships with the people in their past and present environment.

I would like to go into a more detailed discussion of the third type of group therapy as applied to the alcoholics in the state hospital. Approximately 10 per cent of all hospital admissions are chronic alcoholics and like every other state hospital we are faced with the problem of what to do for them since they are usually resentful and reluctant to assume the role of a patient in a mental hospital. They demand: "How long will I have to stay here?" or "How soon can I have a ground parole—there is nothing wrong with my mind." The primary objectives are (1) to gain their cooperation which is indispensable in their treatment program and (2) to impregnate them with an idea that they are in a serious need of psychiatric treatment because their drinking is the result of one or another form of personality disorder from which they are suffering. Patients are seen individually before they are admitted to a group meeting. During these individual interviews, their problems are discussed and it is explained that a combination of individual interviews with the doctors, group therapy meetings and AA meetings offers the best chance of their securing benefit from their stay in the hospital and that the amount of benefit depends on their individual cooperation. The first phase of group therapy is designed to stress that there is a serious problem behind his drinking, of which he may not be aware, and that his own attempts to solve the problem have not been successful and will again fail, unless his new attempts are of a different sort. The group is composed of eight or ten patients, occasionally twelve, meeting twice a week for one and a half hours. For this group, problem drinkers with psychoneurotic personalities or with cyclothymic personality reactions are selected. We also try to choose persons with an IQ of 90 or higher. The attendance is purely on a voluntary basis. The meetings are called "Group Treatment Meetings" and it is brought to their attention that they are not merely "bull sessions." The aims of this form of therapy are broadly explained. After they have attended a few sessions and have gotten the idea of the nature of material to be discussed at these meetings they are given autobiography blanks, which when properly completed, furnish additional information about the patients. During the introductory phase, besides discussing the relationship of habitual drinking to one or another form of personality disorder, other topics are discussed which would illustrate the serious and dangerous consequences which may befall a chronic alcoholic, such as delirium tremens, Korsakoff's syndrome, alcoholic hallucinosis and psychosis. An impressive argument is the sight of a patient with acute delirium tremens or other similar serious disorder. Questions are fired back and forth; interest is aroused and the patients begin to appre-

ciate the dangerous possibilities of alcohol addiction. This question is brought to their attention: "If it can happen to other people, why can it not happen to you?" or "If you continue your drinking, is it not likely that it will happen to you too?" Such questions are interjected in the course of the meetings.

The next phase (second) incorporates modified group therapy approach, taking on the semblance of the academic or classroom technique. Definite topics or subjects are introduced by the therapists and discussed in a semi-formal manner with group members participating by drawing examples from their own lives and from the lives of their acquaintances and relatives. It is more or less restricted to discussion of the topics dealing with, "what constitutes personality, it's development and growth, and the pitfalls that a person may stumble into during the course of his life on the basis of faulty personality developments." It may follow along such lines as discussions of the characteristics of personality, conscious and unconscious mind, the concept of instincts, self and conscience, emotional reaction. At this point, the autonomic nervous system is explained and the discussion padded with numerous examples and charts. Finally, psychosexual development of an individual with all of it's ramifications is discussed. Bisexuality and homosexuality are very popular subjects. This is followed by the discussion of the family constellations, sibling rivalry and finally, school adjustment and work record. At this point, we talk about what constitutes normality and maturity and it's criteria. Throughout this phase, emphasis is placed on the most important features which enter into the dynamics of alcoholism; that is, emotional immaturity, psychosexual equivalents whereby sexual tensions and maladjustments are temporarily relieved and narcissistic neurosis elements. Roughly speaking, during this period, half of the time is occupied by the therapist and the other half by the patients who are able to furnish pertinent examples in their own experiences. They are also encouraged to talk about childhood experiences which are carefully noted since they contribute greatly to the personality makeup of an alcoholic.

The third phase is uncovering, or what we prefer to call dynamic phase. During this period, an attempt is made to have as much individual psychotherapy as possible along with the group proceedings. After the index of comprehension of the psychological factors entering into the personality structure has been raised in the preceeding stage, patients are better prepared to enter into the free discussion of the personal problems responsible for their drinking. Two special techniques are employed at this point, both for experimental purposes. In our previous experience with problem drinkers, we discovered that generally they are not able to develop an adequate insight into their own emotional problems, projecting their difficulties on the members of their family or other alcoholics, and do not accept the characteristics of a chronic alcoholic as applied to them personally. In order to overcome this handicap, we employed two projective techniques during group meetings so that we could present them with evidence of their own projections and use it as a starting point for the combined individual and group therapy. Further, their projective material can be used to advantage in further understanding the dynamics involved in their individual cases. One of the techniques employed is the Thematic Apprecception Test (T.A.T.) administered to the group as a whole. A number of cards are specially selected to touch upon the most likely inner conflicts of an alcoholic. The number of cards is limited to seven, chosen in collaboration with the psychology department. Each card is shown in front of the group and then passed around and they are asked to write a complete story with a beginning and an end. After the test is completed, the interpretation is done by a psychologist in the presence of the therapist, who knows the patient personally, without the presence of the group members. From this test we obtain a better notion of what is the conflict or group of conflicts disturbing the psychic life of the patient because the test allows the patient to unconsciously project those conflicts. Some of these interpretations are annonymously discussed later with the group in order to explain the pathologic aspects revealed and a full explanation is given as to how the projective technique operates in yielding these valuable results and providing us with the "x-ray of self" pictures. After this procedure, which is de-

signed to enhance the intellectual acceptance of the test and uncovered conflicts, patients are seen individually and their test results are gone over and discussed with the ultimate aim to foster not only intellectual but also affective acceptance of their own conflicts. Possible solutions of the conflicts are mentioned during these interviews. This comprises the individual psychotherapy provided for the alcoholic and follows along the conventional lines of such psychotherapy, as well as the principles expounded by Carlos Arango.[2] This experiment was carried out with the group of 12 alcoholics. The findings on the Thematic Apperception Test corresponded closely with those described by Seymour Kolebanoff.[3] An additional observation of interest was that elements of latent homosexuality were detected in 84 per cent of the patients.

The second projective technique can be called a modified psychodrama based on the projective situation tests. In this setting, two members of the group are selected to play extemporaneous roles in a given situation which is outlined on a piece of paper and from then on the development of the situation is up to them.

This particular experiment has not progressed far enough for us to make any valid comments as to its applicability to the group therapy for chronic alcoholics. The situations were devised in collaboration with our psychology department, based on the most common dynamic factors entering into the personality structure of a chronic alcoholic. Ten psychodrama situations were developed from the common psychodynamic elements entering into the personality make-up of a chronic alcoholic: oedipal situation, authority, latent homosexuality, narcissistic tendency, wife as a mother figure, nagging wife, failure in reaching ideals or aspirations and achievements, conflict with law (drunken driving), question of girl friend and marriage, and covert suicidal tendencies. We hope to present these findings in a separate paper.

Summary and Conclusions:

1. Three types of group psychotherapy were discussed as applied to the different kinds of patients in the state hospital. One group was developed for the schizophrenic patient receiving insulin treatment, a second for the severe psychoneurotic female patient and a third for the chronic alcoholic.

2. Combination of group psychotherapy with Thematic Apperception Test, supplemented with the individual psychotherapy based on the interpretations of the T.A.T., was one approach in dealing with the problem drinkers. Another projective technique was also employed called modified psychodrama based on the projective situation tests.

3. Our experiments at the Traverse City State Hospital with the group psychotherapy has benefited the patients and also aided the therapists in their understanding of those patients from the psychodynamic standpoint.

4. Group psychotherapy is not a cure-all nor a substitute for individual treatment. It is an adjunct to it.

5. Through group psychotherapy we reach more patients and convince them that they are not forgotten. It presents an opportunity for greater individualization of care in the large hospital.

6. Properly selected and partially recovered psychotic patients are suitable for the modified group therapy although the benefits they derive are limited.

7. Patients are in favor of group therapy and welcome the meetings as a pleasant break in their daily routine in the hospital.

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*Misconceptions Concerning Hazards of Curarization with Electroshock**

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There are many who still fear the use of curare with electro-shock, yet all who have used it recognize that preliminary curarization adequately prevents traumatic complications. Certainly, its advantages far outweigh any disadvantages.

Recently Riggs and Schlomer discussed "Hazards of Curarization before Electroshock" in the December 1947 issue of *Diseases of the Nervous System*. They report four cases, three in detail, of unfavorable reactions to the use of curare before electro-shock; one with a fatal outcome and the others presumed near fatalities. They also cite two similar cases reported to them by other observers.

I should like to correct what seem to me some misconceptions concerning the physiologic action and dangers of curare therapy and to point out some defects in technical management of the drug. Riggs and Schlomer stated that "untoward reactions of all degrees may follow even the most careful use of this drug. It is probable that these are of several types." They mention sudden cessation of respiratory movement and extreme sensitivity to the drug, caused by subclinical myasthenia gravis, with development of rapid peripheral paralysis. They quote Fegler's[1] work as evidence of the possibility of central respiratory paralysis.

In the three detailed cases, the reactions occurred in extremely agitated patients who before treatment feared death and could not be reassured. In the fatal case peripheral respiratory paralysis occurred, with asphyxia. The patient did not respond to artificial respiration and died from cardiac failure. Electro-shock was not given. The two near fatalities occurred after electro-shock; an asphyxial reaction required prostigmin and artificial respiration.

The technic used in administering curare in all three cases was to give the total injection at the rate of 1 cc. (20 units) per minute, covering three to five minutes or more. (This method, not wholly explicit in the article, was made clear by a personal communication from the authors). This technic we originally recommended[2] but later changed because we found that the slower rate of injection delays the complete reaction of curarization.[3] An improvement is to obtain the peak of curarization within two minutes after injection, best produced by giving the entire injection within one minute.

In their cases, Riggs and Schlomer applied the electric current immediately after the end of the injection. The objective to this procedure is that the patient reaches the peak of the effect of curare *after* the shock treatment has been given. We have pointed out that one must wait two, sometimes three minutes after the injection—testing the patient's degree of motor paresis, until he is unable to raise his head from the pillow. The current is then applied. After the seizure the peak of the curare reaction has passed and usually there are no signs of untoward peripheral respiratory paralysis. Occasionally the jaw and tongue muscles are too relaxed and obstructive stridor is present. This is overcome in a few moments by holding the jaw forward. If respiratory efforts continue feeble and the patient is using accessory respiration muscles, or cyanosis does not promptly clear, then prostigmin may be given.

If complete peripheral respiratory paralysis has occurred as described by Riggs and Schlomer, (incidentally, we have not seen it) then artificial respiration will do little for the patient because diaphragmatic and respiratory muscles are not able to function. The sure method of resuscitation to save such a patient before asphyxia causes cardiac failure is insufflation with oxygen. A tight fitting facial mask is used and the air or oxygen pumped rhythmically into the lungs by means

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of insufflation apparatus used by anesthetists, or the patient could be placed in a respiratory chamber. We have not encountered this degree of paralysis when close attention is paid to the above mentioned dosage and technic of administration.

Animal experimentation with curare has shown that a dog cannot be resuscitated except by insufflation oxygenation. Because with curare both the abdomen, diaphragm and intercostal muscles are paralyzed, there is no tone nor resiliency to bring about reexpansion of the chest cage, once manual pressure is removed. As a result manual respiratory efforts cause no significant tidal exchange. Such exchange can be obtained only with a gas machine or a respiratory chamber.

Another possible cause of increased respiratory embarrassment has been observed by Dr. Mathew Brody. When patients are placed in spinal hyperextension position for treatment the tongue falls back into the pharynx and this blockage of the airway plus accumulation of mucus causes respiratory obstruction. Patients should not be hyperextended when curarized.

One possible exception to this generalization concerning increased hazards the authors have pointed out, namely, the use of curare with extremely agitated, apprehensive patients. Severe apprehension may, in addition to myasthenia gravis, be another contraindication to the use of curare. In all three cases the patients were extremely apprehensive and agitated and feared death. One patient was convinced "the process would prove fatal." The second was "pale and trembling. He paced the flood. He could not be successfully reassured." We, too, have observed that this type of patient, as well as the extremely excited manic patient who has undergone excessive motor activity, is more sensitive to curare and requires smaller doses for physiologic curarization.

This observation is the valuable contribution in the paper. Whether the authors' explanation of the cause is correct remains to be proved. They cite experimental evidence of Altschule and Tillotson that the "cholinergic (vagal) activity induced by electroshock is balanced by adrenergic discharge," but that intocostrin contains substances other than the essential alkaloid, with demonstrated anti-cholinesterase activity. The constituents of introcostrin may upset the cholinergic-adrenergic balance in response to electro-shock and result in exaggerated vagal activity not affected by prostigmin. They also speculate that severe fright altered the adrenergic-cholinergic balance so as to assist curare in the production of postconvulsive hyperactivity.

I do not believe that any essential difference results from the use of intocostrin or of the chemically pure d-tubocurarine. We have tried all preparations and samples of all batches before their release on the market. We found no detectable clinical differences and no side reactions from intocostrin. The only extraneous materials in intocostrin are a few resins not completely removed in preparation, and inactive, tertiary alkaloids.

The fact has frequently been observed in animal experimentation that a very small amount of exercise may return an animal recovering from an injection of curare to a state of deep curarization. The same phenomenon occurs in myasthenia gravis. From this it is evident that fatigue possibly with this accompanying decreased oxygen consumption enhances the action of curare. Therefore, a patient much fatigued by strenuous exercise and resistance or under great emotional stress may respond to a deeper level of curarization from a smaller dosage than normal.

The number of cases given larger doses of curare combined with anesthesia is greater than the total of electro-shock cases and there have not been reported any parallel accidents to these above described. Anesthetists at all times have resuscitation technic at hand. Hewer,[4] an anesthetist, states that in normal dosage "curare has practically no effect on the nervous system, so that it is neither an anaesthetic nor an analgesic." He adds that gross overdosage will produce diaphragmatic paralysis, and if this occurs, "gaseous exchange must be maintained by means of controlled respiration until natural breathing is resumed."

I also feel that another misconception in the article is the statement that a central respiratory paralysis can be present. The authors refer to J. Fegler and G. Fegler as presenting clear evidence "of the possibility of central respiratory paralysis." In my

opinion, Fegler[1] has not demonstrated such an effect. (His preliminary article appeared in French under the name G. Fegler; cf. reference 1). He used crude curare preparations in anesthetized dogs and concluded that curare first stimulated and then depressed respiration by an influence upon the respiratory center, independent of its peripheral effect. Smith, Brown, Toman and Goodman[5] more recently have reviewed all the evidence pro and con with reference to central effects of curare and conclude that curare does not possess central stimulating, depressing or analgesic properties. They found much to be unclear in evidence favoring central properties of curare. For example, it was doubtful whether barbiturates given along with curare by one group of observers may have partially caused the noted signs of central depression or whether some degree of hypoxia may have occurred. In contrast, other investigations indicated that curare-like drugs are either without central effect or may even cause excitation. Concluding that animal experimentation is not wholly reliable and direct evidence of the effects in man is scanty, the authors therefore instituted on a human subject (the senior author) an extensive experiment. In it they gave two and a half times the necessary dose for complete respiratory paralysis to a healthy trained observer over a 33 minute period. No changes occurred in the electroencephalography, consciousness, sensorium or in any other respect indicating a higher central nervous system effect.

This is exactly our observation: My associate, Dr. Paul T. Cash, has examined over 100 patients electroencephalographically before and after complete curarization without observing any evidence indicating central depression in the brain wave pattern. Furthermore, in all our clinical treatments we have never seen any evidence of a central effect in doses we employ. It is possible that in lower animals given larger doses or associated drugs such as barbiturates, that some central effects may be shown.

Lastly, electro-shock treatment in itself has certain inherent hazards, particularly when given to patients with organic complications, especially cardiac; occasional deaths occur. Will, Rehfelt and Neumann[6] recently reported 33 deaths collected from the literature. Only four of these patients were known to have received curare with electro-shock therapy. Where the drug is used and fatality occurs there is the temptation to blame the curare instead of the convulsive shock.

Conclusion

1) An erroneous opinion continues that curare increases the hazards of treatment and 2) Curare is not a cardiac and respiratory depressant. Electro-shock may cause the cardiac and respiratory depression, not the curare. Such symptoms as asystole and bradycardia do not come from curare. Any cardiovascular failure following curarization comes secondarily to asphyxia and not from central respiratory or cardiac action.

Curare is the only safe, effective means we have of eliminating traumatic complications of shock therapy.

There is relatively little danger in the use of the drug in competent hands. Unskilled operators are the danger, not the drug. This is true of practically all drugs given intravenously. There is a complete antidote for curare action and when proper posttreatment management of respiratory difficulties is given, no fatalities need occur.

There is one proved contraindication to the use of curare and that is myasthenia gravis. Riggs and Schlomer have given us another possible contraindication or caution in its use; namely, in extremely agitated, apprehensive or excited patients with panic of death, there may be increased sensitivity to the drug. Much smaller doses need then be used or treatment postponed until the patient regains partial emotional self control.

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Neurological Clinical Pathological Conference

OF THE CINCINNATI GENERAL HOSPITAL

CHARLES D. ARING, M.D., Editor

Presentation

A 38 year old white man was admitted to the Neurosurgical Service on December 23, 1946, complaining of headache and paralysis of the left extremities.

On November 2, 1946, he had suffered a "stroke" which rendered him unconscious and resulted in immediate paralysis of his left limbs. From November 15 until November 29 he was a patient at St. Vincent's Hospital in Jacksonville, Florida with complaints of right-sided headache, slight stiffness of the neck, inability to move his left limbs and incontinence of urine. Examination at that time revealed left hemiplegia, astereognosis and hemianopsia. The cerebrospinal fluid was normal. At ventriculography, lessened resistance was met in the right occipito-parietal region where semi-liquid or gelatinous material came through the needle. There was no evidence of space-consuming lesion; the posterior portion of the right lateral ventricle was dilated and of irregular outline. Microscopy revealed degenerated cerebral tissue. His symptoms persisted unchanged until his admission to the Cincinnati General Hospital. He continued to complain bitterly of severe headaches which on occasion were associated with nausea; he had a few night sweats and some hemoptysis three weeks prior to entry. He resumed control of his bladder.

The only information available concerning his past history was that he had been a patient at the Dunham Hospital (Cincinnati), with pulmonary tuberculosis from March, 1943 to June, 1944 and again from January, 1945 to February, 1946. In 1946 he had worked at the Dunham Hospital as an orderly for approximately four months. Headache had been a troublesome symptom throughout 1946.

On December 23, 1946 the patient was found to be restless and depressed. He demonstrated emotional lability, slight confusion, disorientation and recent and remote memory defects. There was a healed scar on the left side of the neck (at site of old phrenic nerve crush), and limited excursion of the left side of the thorax with decrease in breath sounds and evidence of elevation of the diaphragm on that side, and induration and swelling of the testicle and epididymus, the latter thought to be the result of in-dwelling catheter.

Neurological Examination: Revealed blurring of the optic discs with retinal hemorrhages, left homonymous hemianopsia, left facial weakness of the central type and flaccid paralysis of the left extremities, the muscles of which were markedly atrophied. The deep reflexes were increased on the left, the left abdominal skin reflexes could not be elicited; while the right plantar response was promptly flexor, the left was occasionally extensor. No abnormality of sensation was noted.

There was no change in his condition up until ventriculography on January 30, 1947. There had been periods of noisy confusion and occasional visual and auditory hallucinations. Headache was a frequent complaint for which he received much analgesic and sedative medication. He had many somatic complaints about his throat and heart; of interest was his occasional statement that he had an enormous appetite and was hungry shortly after eating.

Eight hours after ventriculogram he began vomiting, and he responded poorly to stimulation. On one occasion, he seemed to move his left extremities voluntarily; they were rigid for the remainder of his life. After February 2 his head was turned to the right and the neck was stiff. Papilledema became marked. During the ensuing days, six ventricular taps were done. He became increasingly unresponsive and finally comatose and despite the general supportive and antibiotic therapy, he expired on February 10, on the fiftieth hospital day.

Laboratory Data: At the time of admission to the hospital, the temperature was 98.2 degrees F., the pulse rate 75, respiratory rate 24 and the blood pressure 110/80. The temperature fluctuated daily, varying between 98 and 101 degrees F. until ventriculography,

after which it gradually rose to a high of 104 degrees F. There was an associated rise in the pulse and respiratory rates.

On admission the hemoglobin determination, urea and nitrogen and serological reactions of the blood were normal, as was the urine. The initial white blood cell count was 11,950; on February 4 it was 10,000. The blood sulfadiazine reached a level of 34.2 mg. per cent on February 5. The blood urea nitrogen was found to be 50 mg. per cent, the chlorides 44.7 mg. per cent and the CO_2, 61 vol. per cent. After the discontinuance of sulfadiazine, these values assumed more normal levels.

Roentgenograms of the chest revealed pleural thickening and elevation of the left diaphragm with evidence of old, healed, fibrous tuberculosis on the same side. The skull was normal except for burr holes in the anterior parietal and upper occipital regions.

Ventriculograms showed shift of the ventricular system to the right. There was grade 2 dilatation of the left lateral ventricle and grade 3 dilatation of the right lateral and third ventricles. A cystic dilatation communicating with the ventricular system was visualized within the right occipital lobe. The right temporal horn appeared moderately enlarged, the left somewhat small and a bit low as seen in the right lateral view. No air was visualized in the fourth ventricle or in the subarachnoid space.

In the ventriculographic study of January 31, 160 cc. of fluid was removed from the right lateral ventricle. At first the fluid was cloudy white and contained flecks of tissue; with gradual withdrawal of the needle, larger portions of tissue came away and the fluid became slightly bloody. Fifteen cc. of blood-tinged fluid was aspirated from the left lateral ventricle.

On February 1 a right ventricular tap released 60 cc. of opalescent fluid under what appeared to be considerable pressure. At the end of aspiration there occurred a tonic-clonic convulsion of the right upper extremity. In the tap of February 6 fifty cc. of whitish fluid was removed from the right ventricle.

The gold curve and Wassermann tests were normal. Three cultures of the ventricular fluid were reported as negative as were microscopic examinations for tumor cells.

Differential Diagnosis

Dr. Daniel Osher: We have the story of a relatively young man with the apoplectic onset of left hemiplegia which terminated in death after surgical intervention. The apoplectic onset naturally brings to mind a vascular lesion as the essential process. However, when we consider the usual types of cerebrovascular accidents, hemorrhage, softening or embolism, we can marshal little evidence that any of them were responsible for this death.

Cerebral hemorrhage occurring in a young individual without hypertension may be due either to rupture of an aneurysm or bleeding from an angiomatous lesion. There was never any evidence of bleeding into the cerebrospinal fluid. An encapsulated intracerebral hemorrhage surely would have been evident in the first ventriculogram performed several weeks after the onset.

Cerebral thrombosis of the usual type is unlikely because of the age of the patient, and luetic thrombosis also is unlikely because of negative serological reactions. In addition the clinical picture is not that of the usual thrombosis with acute onset and gradual improvement. Embolism is not a likely diagnosis inasmuch as no source of embolus was patently present, and there were no evidences of embolic phenomena in other parts of the body.

This patient had low-grade, recurrent fever and leukocytosis suggesting an infection. Let us first consider tuberculosis inasmuch as there was a story of active pulmonary tuberculosis, requiring hospital care only a year or two prior to the onset of the present illness. Tuberculosis affects the brain in one of

	Initial Pressure mm. water	Color	WBC/cmm.	Protein mg. per cent	Chloride mg. per cent
12/23	145	H2O	0	77	660
1/25	140	H2O	0	127	675
1/31	R. Ventricle	purulent	1620	...	
	L. Ventricle	purulent	1620	47	

two ways, as a disseminated, tuberculous meningitis or as a localized, granulomatous, tumor formation—tuberculoma. Tuberculous panarteritis associated with the former may result in a stroke-like picture. However the lack of cellular reaction in the cerebrospinal fluid is strongly against this diagnosis. The absence of stiff neck and cranial nerve signs also is unlike the clinical picture in most cases of this disease. Tuberculoma does not have the severe progressive course that this patient followed unless the lesion were of large size or associated with meningitis. Finally the lung lesion was apparently arrested.

Syphilitic infection such as meningitis with vessel involvement, or the Lissauer type of dementia paralytica are excluded by the serologic and cerebrospinal fluid findings.

Brain abscess or abscesses would be expected to give a ventriculographic picture of an expanding lesion which this patient did not have. Rarer types of infections such as torula meningitis are very unlikely especially with the lack of cranial nerve signs and the early acellular cerebrospinal fluid.

We may now turn to tumor; a patient with progressive, neurological disease associated with blurred optic disc margins and retinal hemorrhages is, of course, suspect of brain tumor. Also we know that acute hemiplegic episodes occur in a small percentage of tumors sometimes due to hemorrhage into the mass. I believe the two ventriculograms rule out a hemispheral neoplasm. However, tumors growing along the floor of the skull such as an epidermoid, might conceivably compress branches of the circle of Willis producing hemispheral damage. This would be unlikely without concomitant involvement of some of the cranial nerves. A posterior fossa lesion could produce hemiplegia and obstructive dilatation of the third and lateral ventricles, but the absence of cerebellar and brain stem signs rules out this localization.

I am forced to return again to the consideration of vascular disease as the basis for the entire picture. Such a condition may be periarteritis nodosa. Although the classical picture of neuritis, myositis, heart and kidney involvement, hypertension and eosinophillia are absent in this case, enough examples of proven periarteritis nodosa have occurred in which the lesions are more or less restricted to one or another of the body systems and especially the nervous system, to make this a possibility. The suggestive symptoms of extraneural involvement in this patient include the hemoptysis and tender testicle. The general signs of fever, night sweats and leukocytosis are common with periarteritis. Involvement of the central nervous system occurs in about 8 per cent of cases and frequently there may be involvement of the large arteries at the base of the brain as well as the smaller parenchymal vessels. The headaches that this patient had prior to the apoplexy may have been a symptom of an active process preceding the onset of the acute occlusion of the right middle cerebral artery. The later signs of mental confusion, hallucinations, memory defects, increased appetite all point to further progression of the cerebral process, especially in the frontal lobes. The ventriculograms bear out the diffuse involvement, and present evidence of the major vessel occlusion that first led to his incapacitation. Changes in the fundi are common accompaniments of the disease. The earlier cerebrospinal fluid findings consisting of normal pressure, no cells and increased protein may occur with central nervous system lesions of periarteritis. The needle biopsy at the first ventriculogram was taken from the region of the area of softening produced by the major artery occlusion.

The terminal episode may have been a suppurative ventriculitis but in view of the absence of organisms on smear and culture and the failure of response to antibiotic therapy, it seems more likely to have been due to non-specific irritative effect of the gas injected plus and accentuation of the primary disease process by surgery or otherwise.

Dr. Harry M. Salzer: Why were protein determinations not done of the fluid from both ventricles?

Dr. Charles D. Aring: Evidently they were requested, but somewhere in the wheels of organization, the proper procedure fell through.

Dr. Milton Rosenbaum: I agree with Dr. Osher in that I believe that this is an example where the most important point in the story is the onset. I would also be inclined to favor a vascular disease, but whatever it is, it would appear to be a continuing process.

Dr. Aring: The point occurs to me that this might not be primarily a vascular pro-

cess for the reason made by Wilfred Trotter,* in 1929, when he noted that the capsule of the brain (skull) does not allow for expansion and that with each arterial pulse, room must be made by the expulsion of a corresponding volume of the lower pressure intracranial fluids. The mechanism is adequate, but the margin by which it is so is not very large. This circulatory peculiarly is fundamental in cerebral pathology and makes it possible to say that all cerebral symptoms are of circulatory origin. Almost any neurological disease has the potentiality of reflection in the vasculature. While I don't know the answer to this case, I would be inclined to favor a granulomatous type of lesion with vascular onset.

Discussion of Pathology

Dr. I. Mark Scheinker: The autopsy was limited to the brain. The gyri over the convexity of the brain were flattened and the sulci were narrowed or obliterated. There was protrusion of the mesial face of the posterior half of the right frontal lobe beneath the free edge of the falx. The inferior surface of the right temporal and occipital lobes had lost normal configuration and was soft to touch; it displayed a leathery appearance and was discolored brown.

Horizontal sections through the hemispheres revealed a sharply demarcated, massive lesion, occupying very nearly the entire region of the right basal ganglia (Figure 1). The lesion had occluded the anterior part of the right lateral ventricle and extended upward to the corpus collosum, besides blocking the left foramen of Monro. The anterior horn of the right temporal lobe and the portion of the right occipital lobe supplied by the middle cerebral artery were involved in an anemic infarction (See figure 1).

Sections taken from the lesion occupying the right basal ganglia and anterior horn of the ventricle revealed it to be an abscess. The central portion was a large area of necrosis containing numerous polymorphonuclear leucocytes. This central core of necrosis was surrounded by a broad ring of granulation tissue composed of fibroblasts, lymphocytes and plasma cells. In addition there was a well-defined capsule, composed of a dense network of connective tissue fibrils which stained bright red in the hematoxylin-van Gieson preparations. The leptomeninges showed focal accumulations of polymorphonuclear leukocytes and macrophages.

Sections taken from the right occipital and temporal lobes revealed an anemic infarction in the process of organization, which destroyed parenchyma supplied by the posterior branches of the right middle cerebral artery. Large numbers of gitter cells replaced the parenchyma and there was proliferation of fibrillary astrocytes with foci of glial scar formation.

The unusual combination of a brain abscess with cerebral infarction in an area removed from the infection, might be explained some-

FIGURE 1

Horizontal section through the center of the hemispheres to show, 1) the abscess replacing the right basal ganglia and filling the anterior horn of the right lateral ventricle, 2) the dilatation of the anterior horn of the left lateral ventricle, and 3) destruction of brain in the distribution of the posterior branches of the right middle cerebral artery. The hemorrhagic lesion in the white matter of the left occipital lobe was the result of ventricular taps.

*Trotter, Wilfred: "The Functions of the Human Skull," *Nature,* April, 1929.

what as follows: At the outset, the patient suffered from a vascular accident in a portion of the brain supplied by branches of the right middle cerebral artery for reasons that are not clear, to say the least. There was no hyalinization of the arterioles as occurs with hypertension. This initial episode was apparently misinterpreted as a space-consuming lesion. A ventriculography was performed which resulted in the secondary infection in an area of softened cerebral tissue and during the ensuing months, an encapsulated abscess was formed.

Clinical Diagnosis

Softening in the distribution of the right middle cerebral artery of unknown etiology.

Dr. Osher's Diagnosis

Periarteritis nodosa.

Anatomical Diagnosis (Brain Only)

Brain abscess, right basal ganglia.

Infarction in the distribution of the posterior branches of the right middle cerebral artery of unknown etiology.

Dr. Bernard Matthews: Was there no evidence of involvement of arterioles such as one genarally finds in hypertensive brain disease?

Dr. Scheinker: No there was not.

Dr. Matthews: Wouldn't it be unusual to find these major changes along the distribution of a larger artery in the absence of significant changes in the smaller vessels? Isn't it conceivable that the clinical picture might be explained as the result of metastatic infection from a pulmonary abscess?

Dr. Scheinker: It certainly is unusual, but this is an unusual case. No evidence of metastatic infection could be demonstrated, as for example septic emboli, but it is conceivable that such may have become incorporated within the large abscess.

Dr. Aring: This patient is representative of one of the tragedies of modern medicine, which occur rarely, mercifully enough, in large hospitals. The first and most important consideration is that he had been chronically ill for a considerable part of his adult life. Each of us knows how communities generally dodge responsibility for chronic illness. However, we are too ready to forget that people make up communities and that you and I, therefore, are among those repelled by chronic illness.

This man was admitted to our hospital directly from the railroad terminal whence he had arrived from West Palm Beach, Florida. Then began a contest of a sort as to whose responsibility he was, and in the tugging and hauling, the illness unconsciously assumed a role of secondary importance.

Later, grudgingly, he was admitted to the surgical floor, where perhaps he met the same type of resistance (to say nothing of the year's greatest holiday, Christmas) that marked him for "disposition" as soon as he had entered the hospital portals. Before his case was studied, consultative opinions were being requested; rather ironically, the psychiatric resident indicated that the diagnosis and therapy was not in the realm of mental medicine. Meanwhile requests for information from Florida physicians resulted in their report in mid-January, by which time it was obvious that he had had more than the usual stroke, by token of the cerebrospinal fluid protein alone.

Had this man had the stroke in this hospital, I venture to say that the nature of his disorder would have been arrived at with reasonable celerity, but the aura of chronic illness that hung about him seemed inhibiting. There can be little question that had the cerebrospinal fluid been exploited judiciously during the 50 hospital days, it would have given the diagnostic answer. Such fragments of this information as we have, support this judgment unequivocably. Those bits of information regarding the cerebrospinal fluid are so incomplete that they too indicate the lackadaisical manner with which this most important laboratory test was handled.

It is fitting to pursue a failure predicated on human weakness on occasions, lest we become taken with our infallibility and omnipotence. It is a measure of that weakness to look for someone to punish on these occasions, rather than to try to understand why motivations such as these are universal; and that none of us may evade the responsibility caricatured by such an experience.

Editor's Note: These conferences are conducted under the direction of Charles D. Aring, M.D., Professor of Neurology, assisted by I. Mark Scheinker, M.D., Assistant Professor of Neuropathology, and Howard Krouse, M.D., Assistant in Neurology, University of Cincinnati College of Medicine.